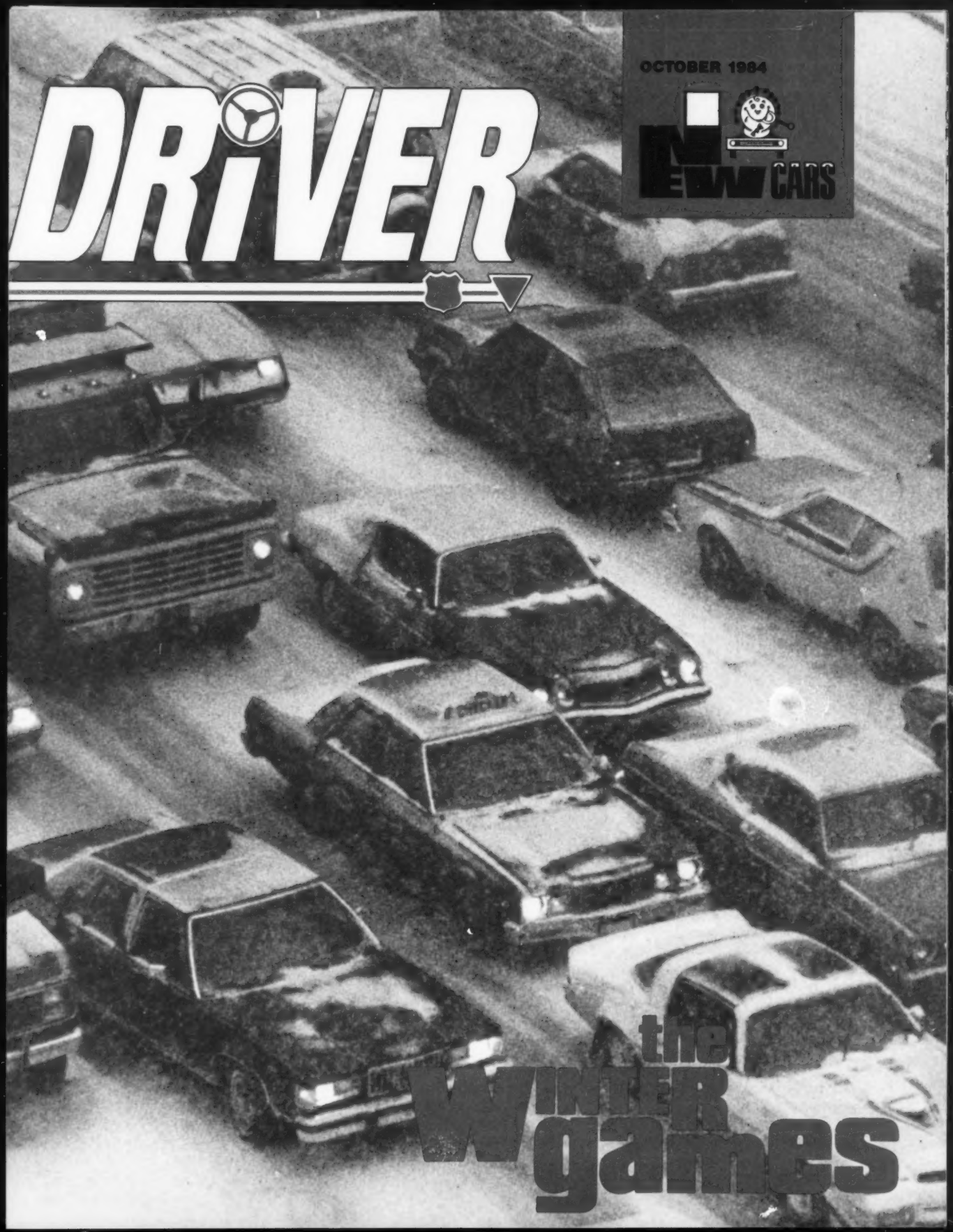
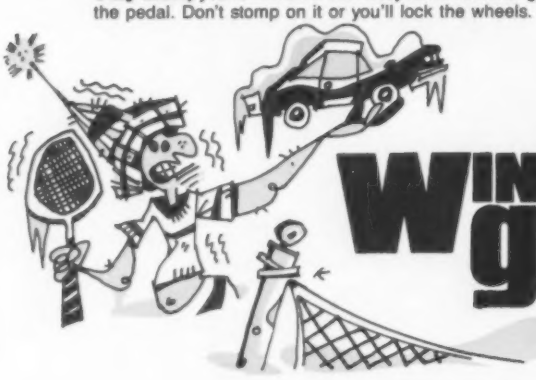

DRIVER
OCTOBER 1984
NEW CARS
the WINTER games

Stay alert; you're in traffic. Be ready at all times to go for the brake and remember to pump the pedal. Don't stomp on it or you'll lock the wheels.



the WINTER games

You could say that winter motoring is ordinary driving in extraordinary circumstances. Because of this, we're here to organize some special "Winter Games." Our Games celebrate the heroic struggle of the average motorist, a true amateur competing in the everyday arena of just getting safely to and from work.

Most of you will "compete" in these Games at some time, if not this winter perhaps in your next assignment.

In these Games, the road to work is your "course," your car is your "equipment" — your bobsled or skis or skates or what-have-you — and the other drivers are your "competitors." You can even "Go for the Gold," only in your case it's your paycheck.

You may think our little fantasy is stretching things a bit, but look at the facts: Like Olympic competitors, you are doing something hazardous. You don't receive any compensation for competing and you bear the entire cost of the equipment. You train, practice and compete on your own time.

All right, may be we *are* stretching it. But let's set the stage for our little fantasy of the "drama of amateur athletics."

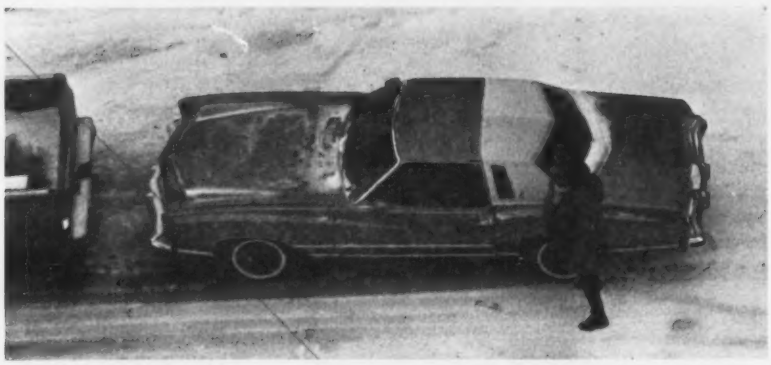
A winter storm is blowing outside as you sit in a living room warmed by a pine log fire snapping and sizzling in the fireplace. You sit back with a cup of coffee and you see that your television screen, like the ground outside, is covered with snow. The picture clears and a musical theme sounds, heavy with brass. The familiar face of a man in a blue blazar appears and he speaks . . .

"Welcome back to our coverage of the Winter Games at Lake Flaccid. I'm Jim McClay. Today, before the competition begins, we're presenting a look at the games from the perspective of the competitors. You're going to hear from some of the experts on the fine points of preparation and training for these Games.

"These champions trained and prepared on their own, sometimes for years, before entering these Games. They had to become familiar with all aspects of hazardous winter driving.

When you see patches of snow, water or ice, slow down before your wheels touch them. Your speed on a dry road is too fast for these conditions.

go for the GOLD



Scrape off all the ice from all the windows. An unobstructed view of the course is vital to your success.

Sometimes headlights are necessary even in the daytime, when snow is falling or in heavy overcast conditions.

Spinning the wheels won't help you. To get going more easily and quickly, put light pressure on the gas pedal, gradually increasing it as the car moves.

Reflecting triangles like these warn of a hazard ahead. Get some for your car, or perhaps some road flares.

"We're going to switch now to Dick Mutton, twice gold medalist in figure skidding, who will tell us how the competitors get their equipment ready for the Games."

Mutton: "Thank you, Jim. The competitors in these Games use ordinary vehicles — just about any vehicle can do the job. They only have to get it prepared correctly for the season, and make sure it is in good running order.

"The first thing they do is to get the cars down to essentials. Since these are their ordinary vehicles, they must get rid of anything that is not needed for the winter events, including old magazines and trash that has been piling up. Then they get to work on the maintenance.

"First, they check under the car at the muffler and exhaust system. Any damage or rusted spots will get worse quickly once sand and road salt get to work on them, so the competitors always replace worn exhaust components. If the exhaust system were to begin leaking, carbon monoxide could be released into the passenger compartment. This gas is colorless, odorless and deadly.

"If they have any messy or complicated jobs to do — the kind we'd all prefer not to tackle when it's cold outside — they do them now. Before the competitive season begins, they do the

continued

THE TRAFFIC SAFETY MAGAZINE FOR THE MILITARY DRIVER

DRIVER

DEPARTMENT OF THE AIR FORCE
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Norton Air Force Base, California
92409

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Maj Gen JOHN H. MITCHELL
Director of Safety
United States Army

COMO JERRY C. BREAST
Commander
Naval Safety Center

Col WARREN L. BUSCH
Chief,
Safety Education Division

VIRGINIA HENDRIX
Editor

TSgt RON LATHROP
Technical Editor

JERI ROOD
Feature Editor

TINA M. PALMER
Editorial Assistant

DON KELLEHER
Art Director

ROBERT KING
Staff Photographer

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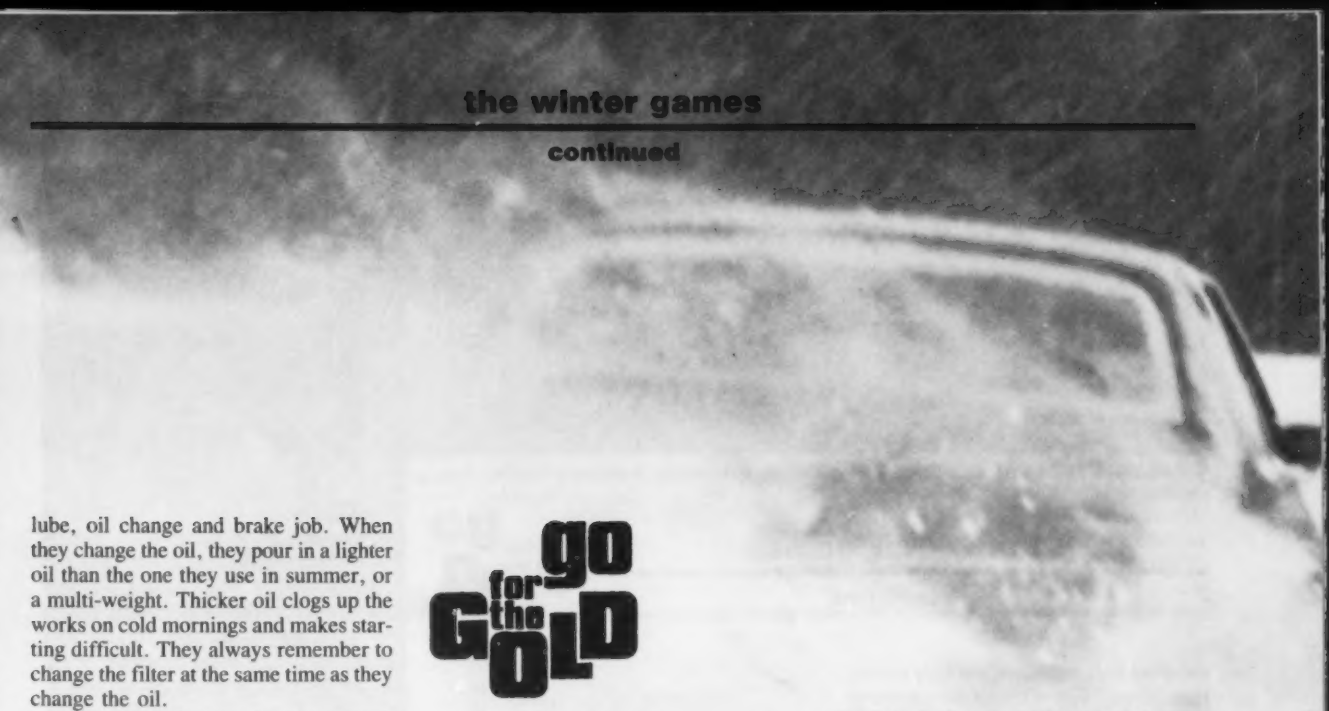


Know how to handle a skid on ice. It happens to all drivers at some time, no matter how good they are.

lube, oil change and brake job. When they change the oil, they pour in a lighter oil than the one they use in summer, or a multi-weight. Thicker oil clogs up the works on cold mornings and makes starting difficult. They always remember to change the filter at the same time as they change the oil.

"Because the battery also has a tough time at the Winter Games, they have it checked out for cranking power. If it is weak, they will replace it so they don't get stranded out on the course somewhere.

"Next, they examine all the fluid reservoirs, and fill them to the proper level with the proper fluid. The cooling system is especially important. A coolant leak could cause the engine to overheat, even in the cold season. And an insufficient amount of coolant mixed with the water in the system could lead to a frozen engine — remember that this liquid is also called *anti-freeze.*

"Finally, they check out the condition of the windshield wipers and the action of the motor. If the rubber blades are old, they replace them. And they always keep the water reservoir filled with the right mix of solution so they can maintain clear vision on the course."

McClay: "Thank you, Dick. Waiting now by the road course is our expert commentator Ingemar Sitzmark, the Swedish champion who won two gold medals four years ago. He has some more information on the athletes' preparation."

Sitzmark: "Jim, in my experience, there is nothing more annoying than being out on the course without the proper tools to finish the event. Besides costing time, and perhaps the loss of the race, it could be dangerous. Here's my advice for future competitors in the Winter Games:

go for the GOLD

"Pack your trunk with the proper supplies and then you can run with much more confidence. First, select a few of the more common tools — some wrenches and screwdrivers. As amateurs. we often don't have help waiting for us if we break down. Include some spare fuses and bulbs, and some oil, and the fluids for whatever power components your car has. Remember the coolant; you don't know when you might need some because overheating is possible even in winter.

"In case you should break down on the road, you will need signaling devices to warn other competitors. Reflective warning triangles or road flares will serve for this purpose. Make sure your spare tire is properly aired up and that the jack is in good working order. Have a good set of jumper cables, in case the problem is a weak battery and someone is kind enough to stop and help.

"Of course, your biggest problem, barring some mechanical difficulty, will be traction on the snow. Buy a good set of tire chains of the proper size for your car and always carry them, in case the road conditions worsen suddenly.

"Keep a small folding shovel in the trunk to use for digging your way out if you should get stuck despite your best driving efforts. And for traction to get you on the road again, have some substance to give your tires a better surface to move on. The substance you use will be up to you. Sand and rock salt will both work here, and some competitors like to use old mats. Personally, I like to use what the Americans call 'kitty litter.' It gives excellent traction for the wheels, it is light and won't damage metal if it is spilled. If I have any left at the end of the winter, my cat Inger gets to use it.

"There are certain items it is best to keep inside the car with you. One is a blanket. If you break down and have to wait for help to arrive, the blanket will keep you warm. The other things to keep in the car are the flashlight and the first aid kit. You will want to be able to find these quickly if they are needed."

McClay: "But there is still some vital equipment we haven't mentioned — the tires. Rosi Litterlier, West German gold medalist in two events in 1976, has some advice on picking the right tires for the Winter Games."

Litterlier: "Yes, Jim, but first I must explain the purpose of the tread. Tread provides the traction which allows the vehicle to move on wet surfaces. On dry surfaces, a tire completely without any tread would be ideal. However, on wet roads such a tire would slide. It would have nothing with which to grip onto the road. The tread gives the wetness — slush, snow or water — a place to go. If

continued

Take curves and turns more slowly than you would on dry roads. A skid on a road like this could put you totally out of the running.

the tread isn't sufficient, not only are the tires illegal, they are also dangerous to use on winter road surfaces.

"Now, while regular tires are not prohibited for use at the Winter Games, they are inadequate for a lot of the driving we encounter. Snow tires are far superior. If you plan to enter the Winter Games and you don't already own them, you should go shopping for some.

"When you consider what to buy, keep these hints in mind. Get the same kind of snow tires as you have regular tires. That is, if your car has radial tires, get radial snow tires. The car will handle better. Whatever you do, *never* mix types of tires on the same axle. This can be dangerous because radials and bias plies handle differently.

"A special type of snow tire is one equipped with studs. Studs are metal (or other material) imbedded in the tires' tread to provide extra traction on uncertain surfaces. They are good in some applications, providing greater maneuvering control. However, they are illegal in some locations because they damage the streets and highways. Check with your local authorities.

" 'All-weather' tires are equipped with a more aggressive tread pattern than regular tires, designed to make them useful in rain or snow or mud. These are another possibility you may want to examine."

McClay: "Thank you, Rosi. So that's the story on preparation for these Games. When the competition begins, the trick is to get out on the course as quickly as possible. Here with some advice on starting out is Jean-Claude Killer, French National Champion and winner of three gold medals in these Games in 1968."

We don't know whether a skid caused this, but the vehicle might be there until spring.

Killer: "Yes, Jim, getting out quickly is the goal, but there is more involved. The winner in these Games will be the one who not only reaches the finish line first, but also gets there with the least trouble. Points are taken off for sliding and skidding, and for getting stuck and for accidents. So the preparation is important and so is training. Here are the necessary steps for effective training.

"I park my car each night in a way so that taking off in the morning will be as

Chains are not difficult to apply, but you should practice before the cold weather comes, or you'll have to rely on people who'll charge for the service.

In the city, be especially careful at corners, where there may be spectators watching on foot.

Fog obscures everything and makes fast driving dangerous. The worse the visibility, the slower you should go. If the visibility is zero, you shouldn't even be on the road.

"On mornings during the Winter Games, most of us encounter a car buried to the hubcaps in snow and locked in a coating of snow, frost and ice. Before we can start the race, we have to get all that off the car, and to do that we have to start earlier than the richer teams who have garages.

"This is the way to do it fast. Shovel the car out of its private snowbank. Get the car started, and the defroster circulating hot air onto the windshield. Then brush all the snow off the car and scrape all the ice off all the windows.

"All the snow has to go because otherwise it would blow off as you drive and create a small blizzard that would interfere with the other competitors' vision. All the ice has to be scraped off because

Studded TIRE information

UNITED STATES

Alabama —rubber studs permitted, metal illegal
Alaska — September 15-May 1; September 30-April 15 south of 60°N
Arizona — October 1-May 1
Arkansas — November 15-April 15
California — November 1-April 1
Colorado — no restrictions
Connecticut — November 15-April 1
Delaware — October 15-April 15
District of Columbia — October 15-April 15
Florida — Studs which do not damage highway pavement are permitted
Georgia — prohibited, except during snow and ice conditions
Hawaii — prohibited
Idaho — October 1- April 15
Illinois — prohibited
Indiana — October 1-May 1
Iowa — November 1-April 1
Kansas — November 1-April 15
Kentucky — no restrictions
Louisiana — prohibited
Maine — October 2-April 30
Maryland — Prohibited — non-residents are permitted use if studded tires are legal in state of residence.
Massachusetts — November 2-April 30
Michigan — state approved "soft studs" only November 15-April 1; northern regions, October 1-May 1
Minnesota — prohibited, except for non-residents, who are subject to restrictions imposed by their state of residency.
Mississippi — prohibited
Missouri — November 1-March 31
Montana — October 1-May 31
Nebraska — November 1-March 15
Nevada — October 1-April 30
New Hampshire — no restrictions
New Jersey — November 15-April 1
New Mexico — no restrictions
New York — October 16-April 30
North Carolina — no restrictions
North Dakota — October 15-April 15
Ohio — November 1-April 15
Oklahoma — November 1-April 1
Oregon — November 1-April 30
Pennsylvania — November 1-April 1
Rhode Island — November 15-April 1
South Carolina — no restrictions
South Dakota — October 15-April 15
Tennessee — October 1-April 30
Texas — only studs which will not damage highways are permitted.
Utah — October 15-March 31 state approved "soft studs" only
Vermont — no restrictions
Virginia — October 15-April 15
Washington — November 1-April 1
West Virginia — November 1-April 15
Wisconsin — prohibited, except out-of-state vehicles may use for 30 days
Wyoming — permitted, chains required in snow emergencies.

CANADA

Alberta — no restrictions
British Columbia — October 1-April 30
Manitoba — October 1-April 30
New Brunswick — October 16-April 30
Newfoundland — November 1-April 30
Northwest Territories — no restrictions
Nova Scotia — October 15-April 30
Ontario — prohibited
Prince Edward Island — October 1-May 31
Quebec — October 15-May 1
Saskatchewan — no restrictions
Yukon Territory — no restrictions

(NOTE: Dates refer to time period during which studs may be used; they may not be used before or after those dates. This information is from the American Automobile Association and is current as of last winter. Check with local authorities to be sure.)

easy as possible. When possible, I back it in so my first movement will be forward. I park it close to a building when I can make use of the warmth and shelter from the wind this will give.

"The big problem is the cold, of course. Cold saps the strength of old batteries, and it makes the motor oil congeal into something like oatmeal. Lacking shelter for the car, some of us install an electric engine block heater, which will keep the motor at a reasonable temperature for easy starts on even the coldest mornings.

"If you keep the ice and snow off the car you'll be that much faster on the takeoff. I use a car cover, which keeps frost to a minimum, and helps me whisk the snow off easily. If you don't like that expense, try using a tarpaulin or a blanket on the windows. Anything that will protect the windows will reduce the work you must do.

"Those of you with car ports should clear them out of all the junk and lawn equipment and park the car under them. This will also help keep a lot of the snow off. Better yet are garages, and best of all are heated garages. Of course, not everyone is blessed with those.

you need to be able to see well in all directions for a safe run to the finish line.

"I have one more hint for the teams who are equipped with garages. When you start the car to warm it up for the start of the race, remember to open the garage for ventilation. As Dick Mutton said, carbon monoxide gas is very dangerous."

McClay: "Thank you, Jean-Claude. Now we've reached the real competition portion of the Games. For that, we've asked Swedish Champion Ingemar Sitzmark to take us through a typical course."

continued

Stuck in a place like this, you'll need to spread sand around the wheels to get the car out, and you'll probably also need a push.

Don't be fooled when the ice begins to melt. Slush is very slick, too.

the winter games

continued

go for the GOLD

Sitzmark: "The driver and the way he drives are more important than what he drives in determining who the winner will be. A better and more cautious driver in a small, light car, will finish better than a four-wheel-drive vehicle with a driver who likes to take chances. With that in mind, let's go to the course.

"After the car is completely cleared off and warmed up, ease out of your parking place. To make this as easy as possible, park each night for easy movement. Try to park where the road is level, or perhaps facing downhill slightly. If you park facing uphill you could slide around when you try to move.

"Starting on snow can be a little tricky until you get used to it. Press lightly on the gas pedal until the car begins to move. Go easy. Too much pressure with the right foot and the wheels will spin because the tires can't grip on anything. When you're moving, feed the engine only enough gasoline to move the car at a moderate speed. Stay below the posted speed limit; that's for dry roads, not for winter.

"You have to move slower so you can plan your movements. Successful completion of any maneuver on snow and ice takes planning and smooth handling. If you know you have to make a turn or a stop soon, slow down earlier than you would on dry roads. Make your move smoothly, at low speed, with a gentle turn of the wheel. The tires will grip better at low speed and you won't risk sliding and losing control.

"As you approach a light or stop sign, slow down earlier than you would on a dry road. That way the cars behind you will also slow down and there will be less of a risk of rearend collisions. Once you've made the stop or turn, remember to accelerate again gradually and smoothly.

"Hills present a special challenge to novice Winter Games drivers. Some think they can conquer a hill with sheer horsepower and a heavy right foot. If you meet with a lot of these drivers — or with those who do not have proper tires — on a particularly snowy hill, you can practice your uphill slalom technique to get around them as they sit and spin their wheels.

"Use a low gear and a moderate speed. Maintain your momentum so you don't end up along with the others who will be late to the finish line.

"In your personal winter event, you might travel on what in summer would be a high speed road. On a lot of these roads the snow will be removed by the sheer numbers of competitors who wear it away. But while there is an uncertain surface no course should be used as a high-speed road.

"While I'm on that subject, I'll speak about the road conditions. Ice is, of course, the most hazardous form of water on a road. No tire, not even a studded one, can give you handling on ice like you enjoy on dry roads. Snow and slush are somewhat better. But *all* are slick. Keep that in mind as you ponder a full-throttle run on even a deserted part of the course.

"Particular hazards on the course are those unexpected changes in road surface. You will often run across spaces where the snowpack gives way to the smooth ice underneath. If you are not prepared for it, you could be surprised and lose control.

"A special condition here is called 'black ice.' This is where shadows across the pavement hide a patch of ice on an otherwise dry road. 'Black ice' is dangerous because of the speed most competitors travel on what they consider to be 'safe' roads. Always be on the lookout for ice.

"Another hidden hazard is the pothole. Potholes, caused by the weight of cars going across areas of weakened pavement, can seriously damage tires and even car suspensions. These road hazards can be easily seen on dry roads, but they are hidden by water or snow. Watch carefully for them and, again, keep the speed down.

"Sometimes your driving is made more difficult with the addition of fog or other limited visibility to the problem of slick roads. If severe fog or ground blizzard conditions are present, you might be wise to consider not competing at all. At other times, you can at least see the lane markings on the road to guide you as you drive. With a coating of snow and ice on the road, these lines could be totally obscured.

"A different visual problem is the glare caused by sunlight on water, ice or snow. On bright wintry days, you should compete wearing sunglasses. These will cut the glare and eye strain."

McClay: "Ingemar mentioned the difficulty in maintaining traction on snow. For an explanation of skidding, we'll switch to Austrian Champion Franz Jammer, whose skill at controlling skids kept him out of the Giant Carom competition."

Jammer: "Yes, Jim, control is the most important part of keeping your vehicle in competition. Control means remaining at the right speed to keep moving, but not so much speed that you spin off the course. Control also means being able to get the car back on a straight course if it skids.

"Skids are partial or total losses of control. On ice and snow, skids occur when one set of wheels, usually the rear ones, get out of line with the others. The

Lowest Atmospheric Temperature Expected	Single Viscosity Oils	Multi-Viscosity Oils
32°F	20,20W	10W-30, 10W-40
0°F	20W	10W-30, 10W-40
Below 0°F	5W*	5W-20, 5W-30

*SAE 5W single-viscosity oils should not be used for sustained high-speed driving (above 55 mph).

OFFICIAL OILS OF THE WINTER GAMES

result is the car doesn't go where you want it to. The rear of the car slides to one side, or back and forth to both sides, or the car spins a few 360s.

"Several things cause skids. The most common is excessive acceleration. Starting out too rapidly or driving too fast on icy roads. Another is too rapid deceleration — braking with too much muscle. And another is too quick a maneuver, like turning.

"As you can see, speed is the enemy. Of course you want to get to the finish line as quickly as you can, but you must pace yourself on ice and snow or you'll skid right off the road.

"Of course, all is not lost even if you do skid. A skid can be controlled if you know the right procedure. First of all, keep your head because you'll need it. If you feel the car's rear wheels go out of line, ease your foot off the accelerator and keep it off the brakes. Steer into the skid. That is, turn the steering wheel the way you want the car to go. If the car's rear end skids to the left, steer left to straighten it out, and right for right skids.

"Be careful, though. If you oversteer you might cause the car to skid the other way. If the car is fishtailing, first to one side and then the other, just keep steering into each skid until you get it straightened out.

"Any braking you do should be done *lightly*. Press the brakes lightly and let off and then press them lightly again. Keep this up until the car is slowed. This is called 'pumping' the brakes. Hard application of the brakes will lock the wheels and rob you of all steering control. Always pump the brakes whenever you brake on ice or snow.

"A skid on a front-wheel drive car is a little different. Since both the power and the drive wheels are in front of you, you can get the rear wheels back into line by touching the accelerator lightly, or by taking the car out of gear — all the while steering into the skid as I explained before.

"A front wheel skid — where the front wheels are the ones that get out of line — is pretty uncommon, and not so serious as it sounds. Although the car will not be responsive to steering, it will also not continue this skid very long. Again, ease your foot off the gas pedal. The front wheels will act as a brake and slow the car down.

When you encounter a sight like this in the morning, you need a shovel, a brush and an ice scraper to get on the road.

"Whatever kind of skid you have, in whatever kind of car, once you've regained control drive along at a slower rate and be careful of those turns. You don't want it to happen again."

McClay: "Thanks, Franz. We have one more hazard to explain before the preliminary competition begins, and that is getting stuck and how to get out. Dorothy Camill, women's figure skidding champion in 1976, has that report."

Camill: "Let's face it; you're stuck. You've been run off the road by an overzealous competitor, or you've driven too fast on an icy curve, or you've just been unable to get your car moving from the parking lot at your apartment. Whatever. You're going to be late at the finish line if you don't get the car moving again.

"First off, you should try simply driving out. Point the wheels as straight as possible and try to move the car by gently putting the foot on the accelerator. If that doesn't work — the tires begin to spin and the car doesn't move — go to step two.

"Rock the car. Accelerate gently in forward and then try it in reverse. When the car gets a little momentum built up you may get going again. Again, don't spin the wheels, because this doesn't help and shows you're an unseasoned winter athlete. If you can get moving by rapidly spinning the wheels, you could have done it much easier with gentle pressure on the gas.

"If rocking doesn't help, get the shovel from the trunk and dig the car out a little. Clear the snow away both in front and in back of all four wheels. Provide them with a gentle incline to move out.

"Whenever it seems appropriate, use a little of your traction agent — the salt, sand or kitty litter — to give the tires a little help.

"If all efforts to move the car yourself fail, you can try to flag down some help. Two people might be able to push the car where one can't.

"If the car looks like it'll be stuck there for some time, be sure to put out warning devices for the other competitors so they can avoid hitting you. Reach in the trunk again for your road flares or reflective triangles.

"You can walk to a phone for help if it's close enough. But if you have to spend any time waiting in your car, then is the time for the blanket Ingemar mentioned earlier. Use it so you don't have to run the heater a lot. If you do run the heater, make sure the car's exhaust pipe is not blocked or plugged and open a window slightly for fresh air. Don't run the heater if the wind is blowing the exhaust back toward the car. Carbon monoxide could be fed into the car that way."

McClay: "Thank you, Dorothy. I think the first of the preliminary runs is due to begin now. This year, the U.S. team includes Phil and Steve Bahre, who are twin brothers and both champions in these events. On the women's side, we have Christin Looper and a relative unknown named Debbie Hamstring . . ."

But back to reality. We've taken a slightly humorous look at winter driving, but we think you see the importance of the information. Keep all our advice in mind as you venture out onto the icy streets this winter. That way you can treat the season more like a challenging "game" and less like a trial to be endured.

NEW CARS

Integral Safety

Today's new cars are safer because modern safety is engineered, styled, tested and built in rather than just added on. Up-to-date safety isn't something that can be bolted on such as bigger bumpers or seat belts; it is an integral part of the entire system.

The manufacturer's continuing vehicle safety efforts involve three major objectives: reliability, controllability and crashworthiness.

Product reliability is based on years of experience in engineering, testing and production, and in terms of the safety, performance and service of the cars in the hands of owners. Against the background of proven performance the manufacturers endeavor to increase the safety of the complete vehicle system year after year.

Controllability of motor vehicles is fundamental to safety. After all, avoiding an accident in the first place is the most effective way known of reducing traffic deaths and injuries.

Some of the most important safety achievements in the past have been directed toward making the car an extension of the driver's own reflexes. Today's cars are designed to help drivers see where they are going; to communicate their intentions to each other; and let them react naturally and easily to changing traffic situations.

To do this the manufacturers have to have an ever-growing bank of knowledge about the people who drive their cars. To this end they're constantly researching such questions as: How do average drivers respond to emergency situations such as a high-speed skid or sharp turn or bad weather?

Of course developing and evaluating the controllability built into cars is a basic function of testing. In addition controllability is under continuous evaluation by the engineering staffs since it is a basic engineering assignment that has a top priority.

The term crashworthiness includes the means to protect the occupants in a car as well as the structural integrity of the vehicle itself. While the manufacturers can't stop people from having some accidents, they do want to make their vehicles as safe as technology will permit in the event an accident does occur.

Safety in today's automobiles starts with engineering of every system in the vehicle including electronics. Here a United Technologies Automotive Group's Automotive Products Division engineer works on a multiplex system that will help automakers reduce electrical wire requirements, saving valuable space and weight.

Rollover and barrier test practices involve imposing a force on the body structure by dynamic procedures and static test devices. They also study occupant motions and the impact performance of various interior components. The data developed through the constantly improving technology of crash testing have contributed substantially to the higher level of crashworthiness of cars today.

However, there are limitations imposed by the current level of technology and by certain physical laws of nature which restrict advances in automobile safety.

Practical considerations also are a factor. For example, manufacturers like to take advantage of the front-end crush distance in their vehicles to help dissipate impact forces. However, there is a point at which increased crush distance becomes impractical.

If two feet of front-end crush helps enable a *restrained* occupant to survive the forces of a 30-mph impact, it would take eight feet of front-end crush to limit these forces to the same level in a 60-mph impact, or 18 feet at 90 mph. Eighteen feet is equivalent to the entire length of the 1985 Cadillac Fleetwood 75 Limousine!

Thus, although added crush distance in varying degrees presents a technically feasible solution to increasing front-end crashworthiness, it has practical limits of applications. Therefore, manufacturers balance performance while looking for alternative workable solutions.

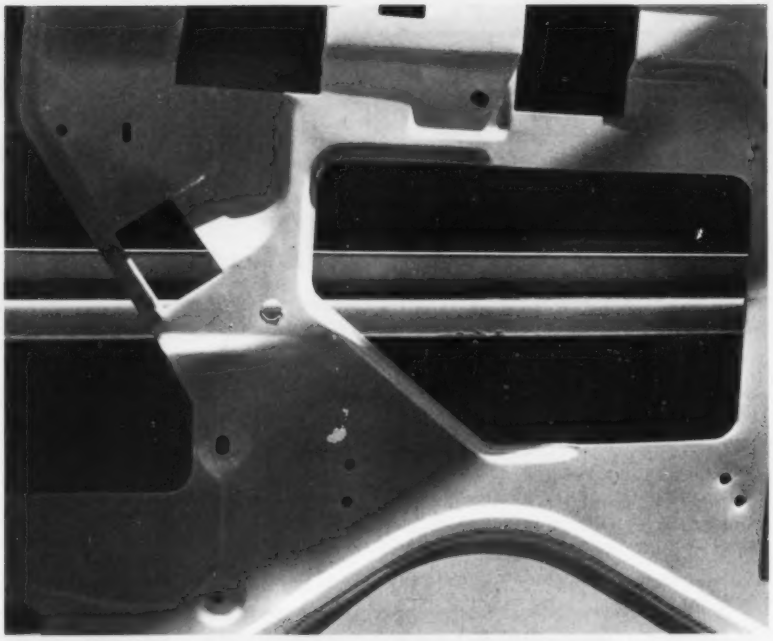
The tolerance of the human body to impacts of all sizes, directions and velocities represents another factor. For example, manufacturers must consider the vast difference between the physiological makeups of a plump, two-year-old child, an adult in full maturity, a woman in the latter stages of pregnancy or a person made fragile by age — all of whom ride in cars and must be protected from accidental injury.

And their designs for occupant protection also must take into account all types of automobiles involved in any form of impact whether it be a front, rear, side or rollover collision.

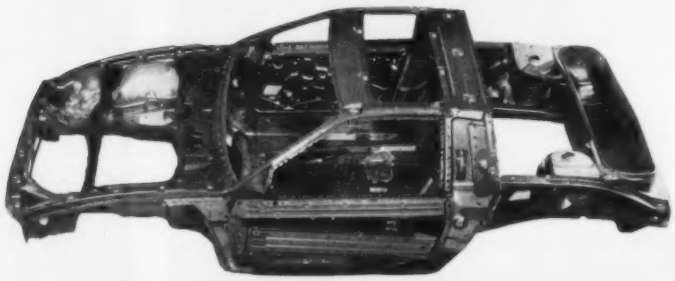
To secure the necessary facts about the impact phenomena, manufacturers annually demolish hundreds of vehicles and run thousands of simulated crashes on im-

For with tires unblowed
And brakes that slowed I can hit
The road at my abode where
The grass ain't mowed
And yodel my ode to the
King of the Road. . .
DETROIT!

Engineering and styling help blend new bumpers that not only qualify for the insurance industry discounts on systems meeting a five-mph test but save weight as well. Rather than use shock absorbers, Oldsmobile engineers are using a polyethylene honeycomb material backed by a roll-form impact bar to save 20 pounds and offer additional protection.



Side impact protection has long been improved by rails such as this built into doors. Yet these have been improved in recent years by use of high strength steels that not only provide better protection but save weight as well.



Pontiac Fiero's steel space frame structure is an excellent example of engineering aimed at the three major safety objectives of reliability, controllability and crashworthiness. The steel space frame provides structural integrity and is Fiero's principal load-bearing and occupant protection element.

pact sleds.

To meet the challenge they have assembled pools of outstanding scientists, engineers and other technical experts. Of course computers accelerate the answers to this quest to solve the complex problems in vehicle safety design.

Yet these answers have to be carefully tested before they can be put into production. And those same answers can only be successful in the hands of the public if they are faithfully reproduced in tooling, production and assembly.

The safety contributions made by engineering and testing should be obvious.

continued

Engineering of even the most basic components continues as in the case of this new power brake system. The system is hydraulically boosted, but boost is provided by an electrically driven pump rather than the power steering pump. The boost pump comes on only when the accumulator senses that hydraulic fluid pressure has dropped below a set minimum. The new system is more energy efficient, since drain on the battery is less than the drain on the engine under the former system. It is also 20 pounds lighter than the previous boost system, lending itself to more efficient under-hood packaging.

Chrysler Pacifica illustrators work on renderings in the design studio that will blend the various elements of a car including safety into an operational system.

An industrial designer transforms an artist's rendering into a fabricated foam model at the Chrysler Pacifica Advanced Product Design Center in Carlsbad, Calif. Chrysler Pacifica uses foam plastic instead of clay (as used in most design studios) to sculpt a concept in three-dimensional form.

a

b

c

d

(left, a, b, c, above, d)
Aerodynamic considerations which are worked out in the wind tunnel still have to balance with such safety items as the bumper gap to anchor a car's wraparound theme, merging function and style with safety.

A two-place mid-engine futuristic sports car is studied carefully by Chrysler Pacifica's design staff in the facility's surface development studio. Models such as this are used for aerodynamic testing as well as to present ideas for blending systems into an operational vehicle.

And the vehicle has to be built exactly as designed if it is to be as safe as intended, therefore assembly is also a contributing element of safety.

But how does styling fit in with safety? As noted earlier, safety is an integral part of the systems that make up a vehicle. For the most part, styling is what holds all the different elements of the car together as an operational system.

The new Pontiac Grand Am presents a good example of the relationship between styling and safety.

Terry Henline, chief designer of the Pontiac One Exterior Studio, had two main objectives in mind for the exterior of the Grand Am. First, it had to be a strong car, with a fun-to-drive, sporty feeling. That means not only did it have to be reliable and crashworthy, it had to have controllability. Hence the three major safety objectives were included in the car's first styling objective.

The second styling objective was to include a certain restrained elegance and dignity.

In any modern car design there are numerous compromises that have to be made to accommodate all the various systems. Yet there are no compromises when it comes to safety.

For example, the visual and aerodynamic lines of the new Grand Am were blended with the bumpers and other safety features to offer a full wrap protective functional consideration. While working toward optimum aerodynamic numbers during extensive wind tunnel testing the elements were combined with such safety functions as the bumper gap to actually anchor the unique wraparound theme of the car, merging function and style.

Styling also carefully blended the Grand Am's rather diverse elements of rounded aerodynamic lines and smooth curves with an aggressive road stance for controllability.

Inside, the safety objectives of reliability, controllability and crashworthiness were also incorporated into style.

According to Pontiac Interior Studio designer Bill Scott, the Grand Am's instrument panel is a driver's dream, with emphasis on the functional locations of the essential driver's controls, which are mounted in hand-control pods projecting outward from the instrumental panel to within finger tip reach from the steering wheel.

Other safety features of the Grand Am interior were designed with a visual and real softness. Rounded edges, rather than hard, are exemplified by the air conditioning grille outlets, which are prominently integrated into the Grand Am's instrument panel fascia.

The seats are as driver-oriented as the instrument panel layout, designed to hold passengers securely and comfortably. The highly-contoured buckets provide a feeling of stability.

Thus the safety objectives of reliability, controllability and crashworthiness are engineered, styled, tested and built into today's cars.

The 1985 Pontiac Grand Am exemplifies the blend of a strong vehicle (passive safety) with an aggressive road stance (active safety).

If crush distance alone were considered for front-end crashworthiness, it would take the entire length of this 1985 Cadillac Fleetwood 75 Limousine to help enable a restrained occupant survive the forces of a 90-mph impact.

continued

NEW CARS

Testing and OSCAR

Before engineering concepts can be converted into production realities, new car designs must undergo extensive testing to ensure that the vehicle performs as the engineers intended. Testing is done with the aid of the latest technical apparatus and under the most favorable scientific conditions to identify points of weakness as well as strength, and then measure them.

These tests are accomplished at proving grounds where private roads duplicate practically every kind of highway and byway. In addition, there are many stretches of special test roads more punishing to automobiles than any the average motorist would likely see and roads designed specifically for highway scientific, precision engineering.

Some of the questions asked during body tests include: How much protection can an automobile body afford its occupants? Is it strong enough to withstand a barrage of road shocks? Does it keep out drafts and dust, and does it mute road noise?

In actual crash tests whole bodies, components, safety belts and lifelike dummies can be activated in the same violent manner as in real crashes while instruments and high-speed motion picture cameras record every detail.

It used to be that rollover tests consisted of tipping a car on its side and allowing it to roll over down a hill. And barrier tests weren't much more scientific. A test driver would bring a car up to the designated speed and jump out just before the car reached a make-shift barrier. Or an unoccupied car would be directed down a hill toward a barrier made of portable concrete blocks.

Today, fully instrumented impact sleds help develop data to contribute to the higher level of crashworthiness cars have.

Because steering systems give drivers their primary means for vehicle control, they are tested to insure they faithfully reflect a driver's touch under numerous situations. To determine a steering system's ability to perform in normal and emergency conditions it must be given a full-scale, real-life workout. Steering angle deflections and forces must be checked. Steering effort has to be measured. The system's ability to deal with crosswinds and handling during blowouts must be evaluated.

Additionally, vehicle stability as well as wheel and tire strength are tested.

Engines and transmissions require years of painstaking development work in the design rooms and laboratories. Yet the final result of their performance and reliability can only be evaluated under exhaustive road testing. Of course there are also tests for exhaust emissions and fuel consumption.

A car's brake system must be developed to provide reliable performance under extreme variations of operating conditions. Testers must answer questions such as: Will the brakes hold on steep grades? Will they lose stopping power on long grades? What happens if they get wet? Stopping rates, pedal pressure, pedal travel, performance and durability are all measured in brake tests.

In fact, the original concept for the General Motors Proving Ground grew out of a need to decide whether they should equip their cars with four-wheel brakes in the early 1920s. And that's a question related directly to controllability and safety.

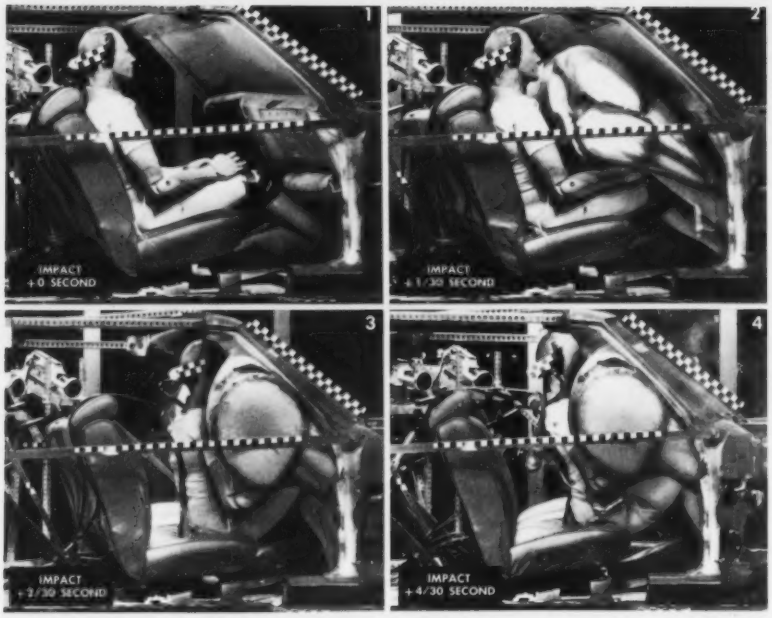
Suspensions have to be tested for ease of handling and complete driver and occupant comfort. This requires unique development tools to insure customer acceptance. Some of the questions that testing must answer are: How does the car ride on expressways, or on secondary gravel roads? Does it sway in sharp turns? Does it absorb severe and repeated punishment from rough bumps?

Testing continues even after production, with vehicles being totally dismantled for inspection after completing

A test driver puts a 1985 Buick Somerset Regal Coupe through its paces, checking steering, engine, transmission, braking and suspension.

American Motors technician Rich Ahrens records test data.

OSCAR's computer, a color monitor, and an array of other electronic tools and gauges are housed in a GMC Magnavan. Next to the van is a 1985 Buick Regal Grand National ready for testing on the GM Proving Ground's "Black Lake," a 67-acre vehicle handling laboratory.



An early example of the air bag, General Motors' experimental Safety Air Cushion reveals its effectiveness in this series of test pictures.

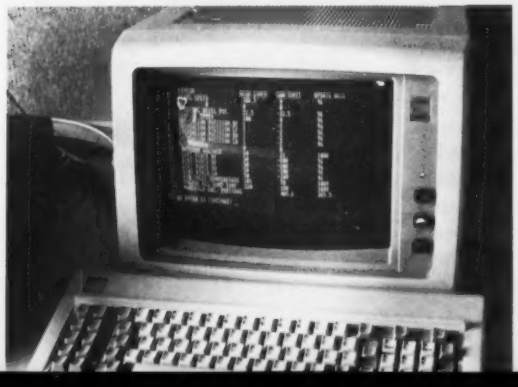
Some of OSCAR's leads and on-board sensors for monitoring a broad spectrum of data.

tens of thousands of miles of durability tests run in all kinds of weather, around the clock.

The latest technologically advanced testing equipment is a mobile research system that provides for faster and more accurate engineering development.

Buick's "OSCAR" (On-Site Computer-Aided Research) is a system of car-mounted sensors which provide data to a 256K memory computer installed in a GMC van. Virtually instantaneously, engineers can determine how the test car is operating and what changes, if any, are required to meet performance specifications.

"Since we'll be using it initially to assist race teams using Buick V-6 engines, those specs could be on the order of 750 horsepower and speeds in excess of 200 mph," says Joseph Negri, manager of special products engineering. "But OSCAR can be just as useful in reducing engineering development time and costs on prototype passenger cars."



Less than a minute after being fed into OSCAR's computer, the data are displayed and ready for analysis.

"We're now able to run a car on a test track and monitor operating data which literally change in fractions of a second," adds George Claypole, the engineer who coordinated OSCAR's development. "Our dynamometers, wind tunnels and other laboratory equipment already have told us what the data should be. Now OSCAR's computers tell us how the real world correlates with the laboratory environment.

"The result will be a substantial improvement in the performance quality of the car, as well as a reduction in the time and cost required to bring a car from development through production," Claypole said.

OSCAR's 16 on-board sensors monitor a broad spectrum of data: crankshaft position, spark timing, battery voltage, air inlet temperature and pressure, engine oil pressure and sump temperature, throttle position, manifold absolute pressure, suspension position, vehicle yaw, speed and steering wheel position. In each of those major categories, dozens of component measurements are made, some as rapidly as 100 times per second with an accuracy within one percent.

Included in OSCAR's system is a complete weather station which measures temperature, pressure, dewpoint, wind direction and velocity, so engineers can correlate vehicle operation with ambient conditions.

"In developing OSCAR, we studied existing facilities as thoroughly as possible," Claypole said. "While there are a few, more limited test systems in use, nothing approaches the capability and versatility of the Buick system. OSCAR can collect and analyze data that simply haven't been available up to now."

Negri adds that a major design criterion for OSCAR was to ensure its use could be expanded as necessary.

"As we gain experience with OSCAR's ability to precisely measure vehicle operation and pinpoint possible trouble spots, we can fairly easily double the number of sensors from 16 to 32 and increase the power of the computer. If we decide it is worthwhile to do that, there will be very little going on anywhere in the car we won't know about."

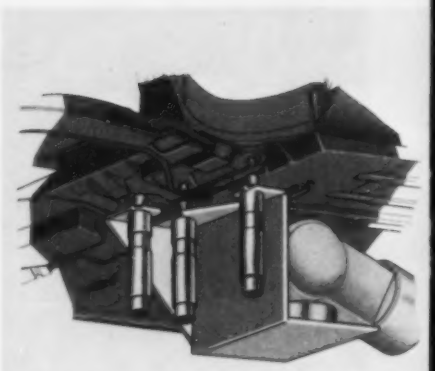
"We don't know of a more useful tool to help us make sure that future Buick products deliver all the quality and performance we've engineered into them," Negri said.

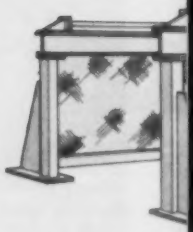
continued

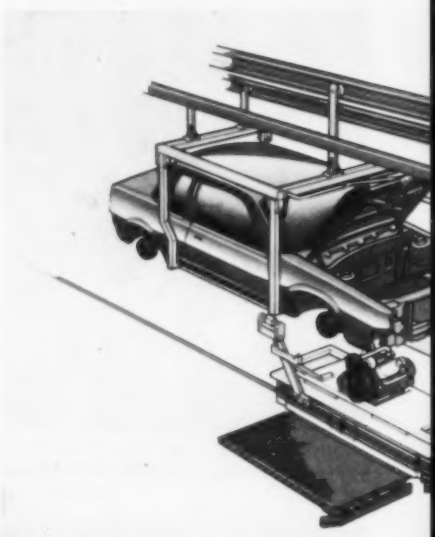
NEW CARS

Converting Concepts Into Production Realities

Using a vision-guided robot, a difficult manual operation is eliminated in the GM20 assembly plant. As each car passes through this assembly station, a robot mounted on a moving carriage tracks with the car and secures all of the fasteners for the front suspension components. In order for the robot to locate the fasteners on the car, a "vision system" is employed. Video cameras scan the underside of the car and the signal is sent to a microprocessor computer. The computer interprets the video image and sends instructions to the robot controls which guide it to each fastener.







Engineering, styling and research combine with exhaustive programs of design, prototype building, testing and development to produce safer automobiles. This is only useful if the same safe vehicle can be delivered into your hands. To do this the manufacturers have to faithfully reproduce the vehicle throughout tooling, production and assembly.

The hand assemblers in Europe have been doing this for decades. The Japanese are perceived as being able to do the same. And now, through extensive conversions of existing facilities, American manufacturers are converting these concepts into production realities.

To better help you understand how the manufacturers are attempting to assemble safer cars, DRIVER recently toured the latest complex to come on line in North America: the GM20 facility in Lansing, Mich.

More than $300 million has gone into conversion and tooling for the new program at both Oldsmobile and Fisher Body-Lansing. The result is an integrated production facility with the highest capacity (120 vehicles per hour) of any General Motors location in North America.

Most external metal and plastic parts are fabricated at Oldsmobile and sent to nearby Fisher Body-Lansing for assembly into bodies, which are then returned to Olds for vehicle assembly. The North Assembly Complex builds the Somerset Regal and Oldsmobile Calais, while the South Assembly Complex builds the Pontiac Grand Am and Olds Calais.

The first thing you notice upon entering the North Assembly Complex through the employee entrance is that it has been brightened up considerably with a new paint job and colorful graphics. This colorful addition is seen through the complex and is just one way the work environment has been improved.

Once in the complex on the first floor, you see additional examples of improved integration of worker and workplace. It's all part of a process called ergonomics — the designing of an environment around the physical characteristics of the human body.

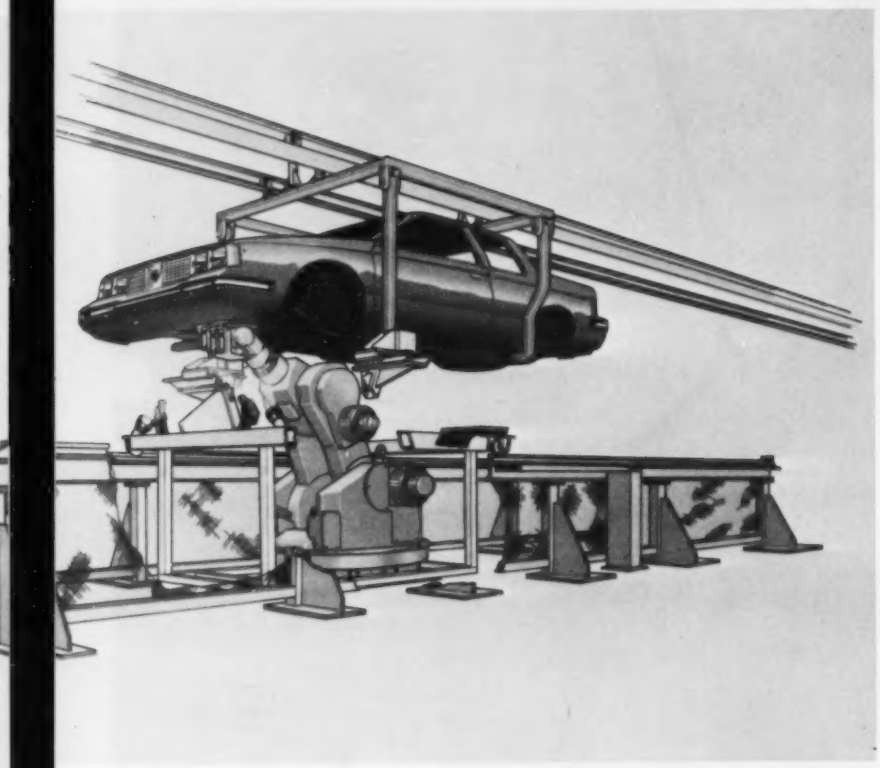
For example, you'll notice that the traditional pits in the floor have been eliminated, with assembly work now done at heights adjusted to employees and not vice versa.

The training of the employees to build the GM20 automobiles was crucial to the success of the programs, according to Oldsmobile. Therefore, Oldsmobile sponsored its largest training effort ever to meet that requirement. Millions of hours in classroom time were devoted to subjects ranging from team build to hands-on work with the new equipment installed in the two facilities. Employees will also receive training on an ongoing basis to keep them up to date on the skills they need to do their jobs.

Virtually the entire GM20 program is employee sensitive to not only aid its workforce but to help it improve the quality of the product it is building.

One of the first examples of improved technology you see is an articulating arm, which relieves employees of some weighty work. Operators are now able to move large pieces of equipment with a feather touch while the articulated arm's pneumatic cylinders support the tool's entire weight. Not only is the tool essentially weightless but operators are also isolated from the torque reaction created when a 50-pound air wrench bottoms out.

Next you notice the new team build concept at work, with employees working in groups of about 15 as they move cars through the assembly process. This is a philosophy that actually began at the beginning of the GM20 program, when employees representing both the hourly and salaried workforces joined forces to draft the blueprint for success of the vehicle. Right from the start, employees realized the stake they had in GM20 and the part they could play in determining its



goals.

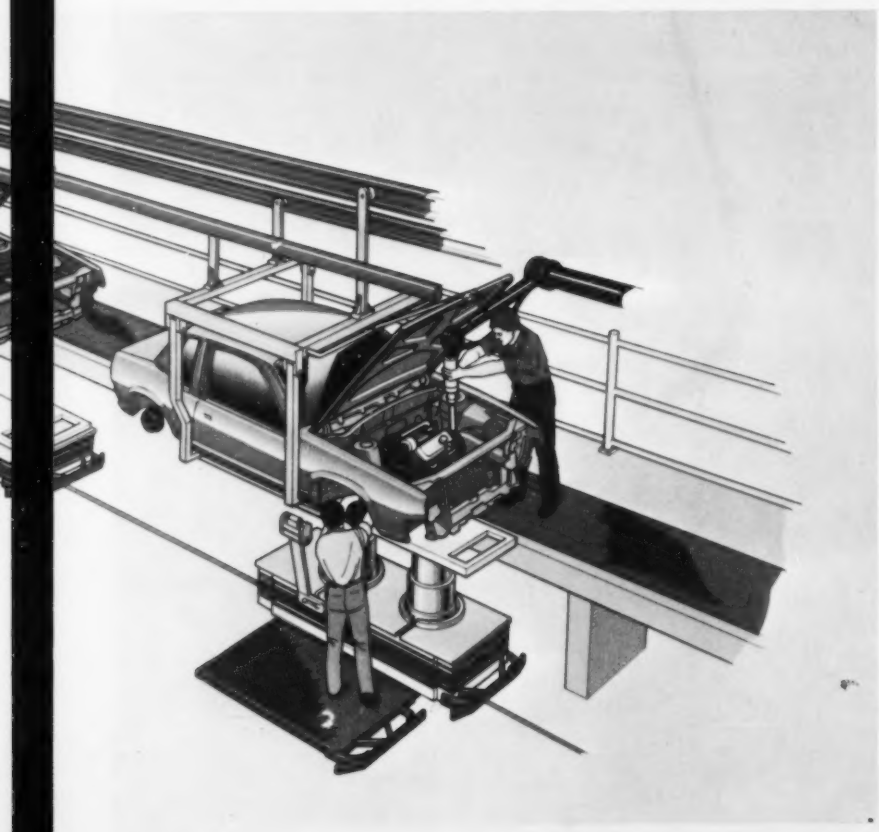
After that you'll notice another example of the new technology which contributes to GM20's high quality criteria. This is a large automatic welding system, which guarantees that crucial welds on vehicle exhaust systems are done perfectly every time.

Automation of this process means that those fraction-of-an-inch errors are eliminated, thus contributing to improved quality of the vehicle overall. After all, even minor mistakes can result in major problems later on.

At the North Assembly Complex receiving areas you see an expanded dock where supplies for the complex are received under a just-in-time system. This system eliminates costly inventory build-ups because parts and components arrive very close to the time they are needed.

There's also less transportation cost now because nearly all GM20 suppliers are located within no more than a 250-mile radius of Lansing, with half of them located within 100 miles of the city.

Oldsmobile has worked very closely with its suppliers to ensure that only 100 percent perfect parts are delivered 100 percent of the time. This is crucial in a just-in-time system of small inventories.



A unique new conveyance method is used in the GM20 assembly plant to "marry" the engine to the body. Automatic guided vehicles (AGV), which follow a signal wire embedded in the floor, are used to carry each engine assembly to the car rather than a conventional conveyor. Each AGV is equipped with a hoist which allows the operator to raise the engine into the motor compartment where it is then secured. A platform mounted on the side of each AGV permits the operator to ride with the job, making it easier to perform this critical function.

One of the most innovative aspects of the GM20 assembly process is the automatic guided vehicle system, or AGVS for short. The AGVS features self-propelled vehicles which move automatically on a highway of wires embedded in the floor.

The vehicles were designed especially for this facility and the employees helped in that design, which includes a platform on which the employees can move with the vehicle. Powered by on-board rechargeable batteries, each AGVS vehicle contains electronic sensors which receive a radio frequency transmitted through the in-floor wires.

These AGVS carriers are used to carry chassis assemblies and engines through

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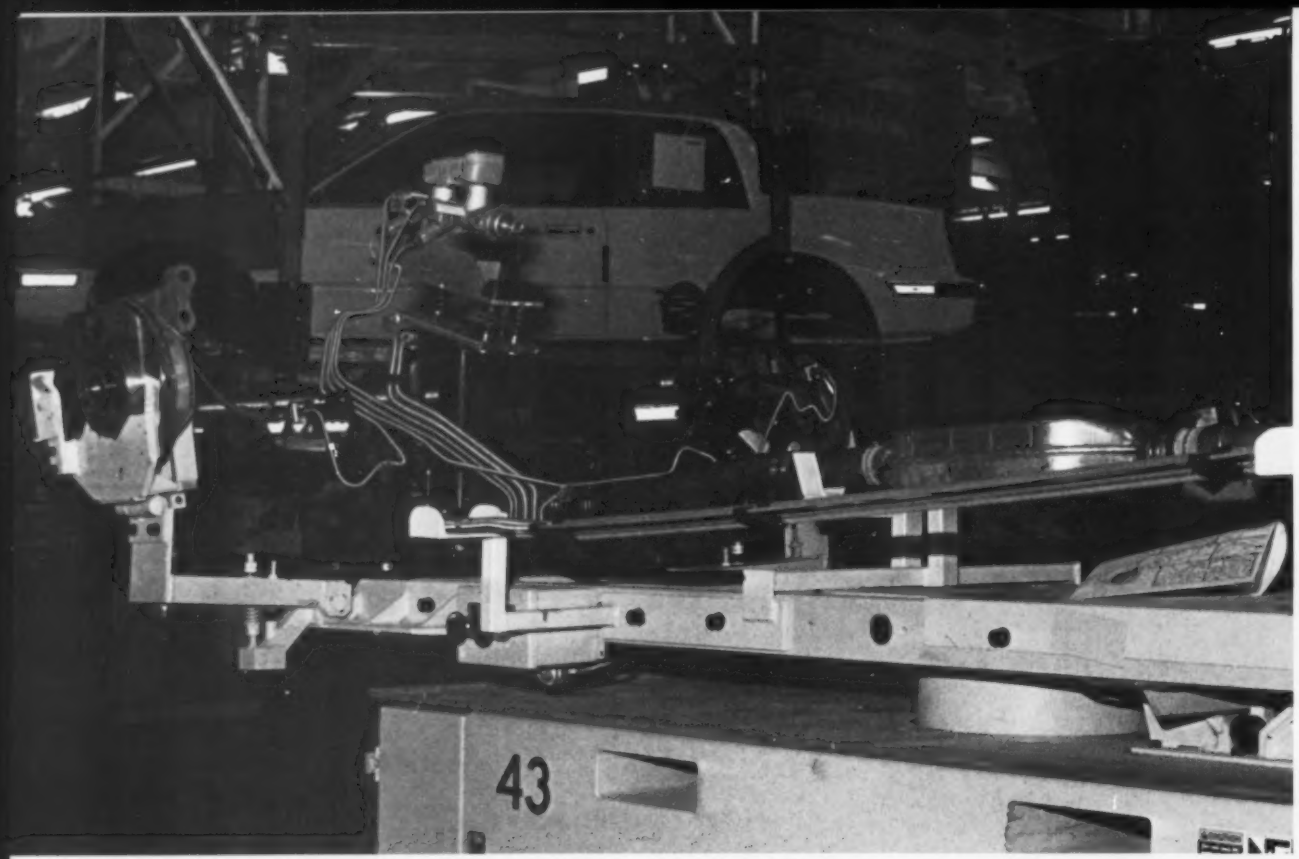


The automatic exhaust pipe loader and brake machine approaches the assembly line.

At the end of the assembly line vehicles are roll tested in a number of areas including brakes.

the build process and then merge with the conveyors to marry those parts to the bodies. The AGVS carriers are programmed to stop at each operator's work station and also to stop at the automatic exhaust pipe loader and brake fill machines. The stop and go capability helps ensure that work is completed correctly within the stations.

The AGVS is also reprogrammable, which means that an entire process can be rearranged by simply rerouting the in-floor wire, making the vehicle flexible for any future changes in the assembly process.

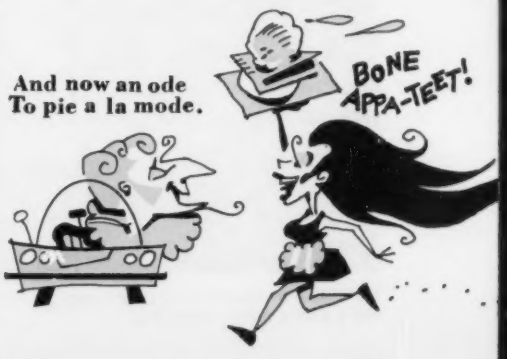
Upstairs the GM20 vehicles actually come off the line. The final checks and tests on the car are completed with the latest technology, such as the equipment in the audit area. Here, six cars come off the line every day for reevaluation.

The audit area used to be located in a separate building, but it was relocated with the assembly complex to give the subject of quality even more visibility. Employees now meet in the audit area and, as a result, have become more aware of quality on a daily basis.

The final stop is the test roll area, where the combination of employees and a computerized system called dynamic vehicle test contribute to a quality vehicle. Here, tests on speedometer accuracy, transmission shift points, engine performance, and vehicle emission control are performed. As the driver puts a car through its paces, the computer collects data from the vehicle's on-board computer. This system helps guarantee customers a thoroughly tested, fully functional automobile.

(left, top)
The Oldsmobile-developed master cube system enables reliability engineers to get an early look at metal parts against the perfect surface and in relation to one another. Made of a plastic material, pieces of the master cube can be removed and replaced with metal parts until the entire car is made of metal. Computer-linked scanning equipment determines how the part or parts compare to the math data base of the "perfect" car.

(left)
An indication of the success of a car program is the way all the parts fit together. The match check is critical evidence of the success of new technology and tools.



Hypothermia

Autumn is already here with winter only a gust of wind away. As a result, in some areas the motorcycling season is already over, while in other places the weather is ideal for riding. However, regardless of the location, what should be a feared foe of all outdoors people looms near: hypothermia.

Dressing properly not only provides protection from the elements, but it makes safety sense, too.

If you're shopping for cold weather gear be sure to check out insulated gloves. They not only keep your hands warm but provide plenty of control grip as well.

hia

Hypothermia is the loss of body heat that causes a lowering of the body's inner core temperature. This, in turn, results in uncontrollable shivering.

When the body's inner core temperature is lowered, the blood also becomes cooler. Cooler blood stiffens muscles which causes clumsiness. When cooler blood reaches the brain it impairs nerve-to-muscle coordination, aggravating the clumsiness. Cooler blood also impairs all mental processes, especially judgment.

In most cases those suffering hypothermia fail to realize what a dangerous situation they're in. They're unaware of how fatigued they're becoming. Their reactions are slower. They pay less and less attention to the tasks at hand. Their drowsiness increases. And their ability to concentrate is reduced.

If the body's inner core continues to lose heat there is a fairly rapid descent into unconsciousness and death. Mountain climbers call hypothermia "the killer of the unprepared."

Of course the body doesn't start down this path towards death without putting up a fight. One of the body's first responses to cold is constriction of the blood vessels of the skin to decrease heat loss. The skin then insulates the body's inner core areas against the cold.

However, at the same time the skin also becomes numb and muscles near the skin weaken, particularly in the hands. The hands are then useless for fine or coordinated movements. On a motorcycle this can spell disaster.

The body does produce its own heat from food and muscular activity. In fact, the uncontrollable shivering is a heat producer equal to slow running. However, such activity consumes much energy and leads to exhaustion, which contributes to hypothermia.

There are external sources of heat for the body. These include the sun, fire and hot liquids. So a cup of hot coffee, tea or chocolate could be a real life saver — literally.

The body's heat loss is part of its self-cooling system. The heat is lost via *radiation, conduction, evaporation* and *convection.*

In the case of *radiated* body heat loss, at 40 degrees Fahrenheit almost half the radiated heat is lost via the head. At five degrees this increases to three-quarters. As you can see, a motorcyclist's helmet does more than keep outside forces from damaging the skull; properly fitted, it keeps the heat loss to a minimum. As the old saying goes: If your feet are cold, wear a hat.

Heat is also *conducted* away from the body. Metal, such as that used for the handlebar controls of a motorcycle, is such a rapid conductor of heat that bare-

continued

This is a Throat Coat that can be stuffed inside your jacket and either up under or around the lower portion of the helmet.

continued

Ski masks offer excellent face protection for either open-faced helmets with goggles or behind face shields. The major problem with stocking or watch caps that stretch down over the face with a couple of holes for the eyes is that they don't usually fit under a helmet.

A simple rain suit will keep the water and wind out, but you'll have to dress warmly under it during colder weather.

hand contact can leave frozen skin on the metal or cause frostbite. For this reason gloves are extremely important. Additionally, all riders need to have protective layers of clothing between themselves and any portion of the machine.

Liquids, especially gasoline, are also dangerous conductors. Of course gasoline will remain a liquid at temperatures far below the freezing point of water. Therefore it is necessary to dress to stay dry as well as avoid exposing bare skin to fluids.

Evaporation heat loss occurs on the skin (sweat) and in the lungs (water vapor). If this moisture is trapped it can freeze, so evaporation must be helped. This is another reason why numerous layers of clothing are better than a single layer — the moisture can escape into the outer layers of clothing rather than being trapped next to the skin.

Convection or heat loss because of air circulating next to the skin, is another reason for layers of clothing. The loose first layer retains warm air next to the skin, reducing the heat loss.

Cold weather motorcycling requires riders to eat well, drink hot liquids, avoid over-taxing themselves and dress to stay dry and insulated from the wind.

The same can be said for motorcycling during the mild weather of Indian Summer. Many riders have suffered the effects of hypothermia because they exposed their bodies to cool off or catch the sun's rays.

In addition to overcooling their bodies, people who ride with exposed skin can rapidly become dehydrated. The wind of the speeding bike will evaporate their perspiration *before* it can naturally cool their bodies. As a result their bodies continue to sweat which leads to dehydration.

So even in the mild temperatures of a sunny fall day, motorcyclists should wear windproof clothing with layers for insulating as well as absorbing sweat.

(above and inset)
When shopping for outer wear be sure to buy a very bright color. In addition, those outfits that have reflective tape sewn into their design provide additional visibility.

(below)
For riding in really cold weather consider a full snowmobiler's suit. And make sure that your boots not only keep your feet warm but grip the pedals as well.

This is the third of a series of articles about driving conditions at ATC technical training centers.

Driving at Lowry

by TSgt. CHUCK KUBIN
Lowry Air Force Base, Colorado

With hundreds of newcomers arriving daily from other states, uncertain weather, and a few local quirks, driving in the Denver-Aurora metro area surrounding Lowry AFB can confuse the unsuspecting.

Lowry is sandwiched between Denver and Aurora, an area that is home to almost a million people. All the challenges of driving through city, country, industrial, residential, plains and mountain situations exist within an hour drive of the base.

Bright city lights: Colfax Avenue, one of the longest city streets in the U.S., looks convenient on the map but has stoplights on nearly every corner which hold on yellow for only an instant. Frequent stops give drivers plenty of time to observe distractions ranging from stores to street people. Running yellow and red lights is almost a local habit. In fact, drivers can anticipate three cars transiting an intersection after the light turns red.

Parking downtown is another major challenge. Those who repeatedly park illegally may find themselves cursing the famous "Denver Boot," a steel bar-and-disc device that police bolt to one wheel, making it impossible to move a car forward or back. The "boot" is liberally used. Police also check parked cars to ensure they have an emission control sticker, and issue tickets to those without them.

Denver offers pedestrians a break downtown. All four lights are red at once, giving walkers a chance to cross intersections diagonally. Colorado provides for right turns on red except when posted and left on red from one-way to one-way streets. U-turns, however, are illegal within the city limits.

Two particular sections of the interstate can be rough. An elevated section of I-70, north of the downtown area, is on a long bridge above its surroundings. Ice on the street and high winds are common. Not all urban sections of the interstates have shoulders; a breakdown in those areas is both a hazard and a nightmare.

"Mousetrap," the intersection of I-70 and I-25, is an appropriately named maze of underpasses, overpasses, viaducts, banked curves and lane changes. Daydreaming drivers can find themselves on the wrong road if not paying absolute attention to the signs. Some interstate ramps even have stoplights to delay access to heavily traveled sections.

Where am I? Navigation around the city is relatively easy . . . with either a good map or some knowledge of the city. Streets are laid out on the four compass points except downtown, where the grid of one-ways fans out diagonally. Most Denver streets are named alphabetically in sequence. For example, Cook St. will be followed by Dean St.

The Rockies are the best compass reference. Drive toward them for west, away for east; put them on your left for north, right for south. Drivers can see the mountains from most everywhere in Denver and Aurora.

From the mountains to the prairies: Denver itself is about 15 miles from the mountains. On the plains to the east and north, roads are flat, straight and fast. To the south and mountainous west, roads climb and twist. While a visual treat, the mountains are an enticing distraction. Passing is hazardous at best. Traffic jams on mountain roads, especially during ski season, are common.

The vast majority of mountain roads are clear and well-maintained, even in the winter. However, patch ice, loose gravel, hairpin turns and steep grades call for a healthy transmission, brakes and reflexes, especially when on a motorcycle. Many Coloradans habitually exceed speed limits regardless of weather.

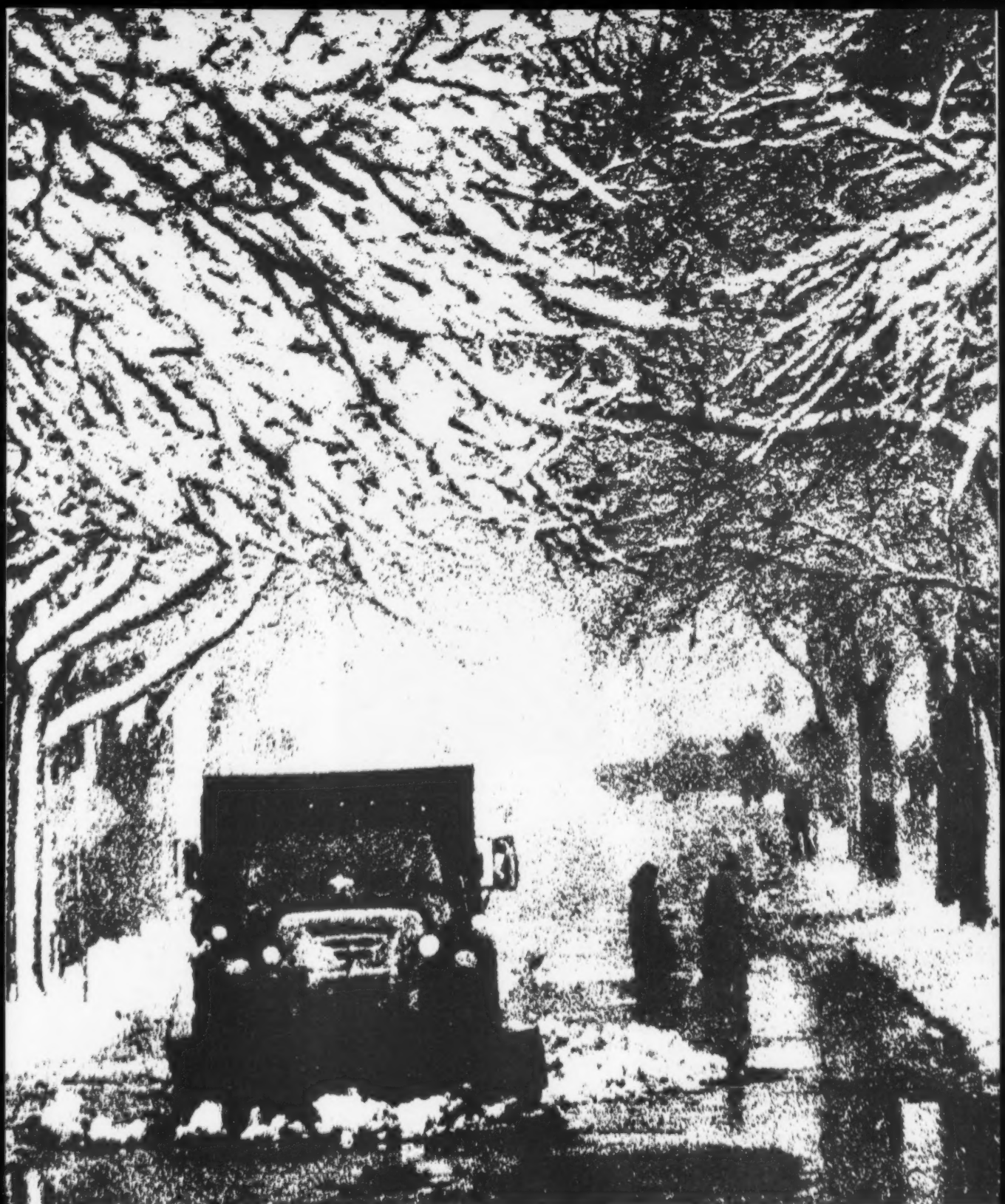
Weather or not? Most people expect Denver to be in an Alpine setting. In reality, it can be much like Florida with 300 days of sun per year. It can also be like both the tropics and the arctic in a 24-hour period. Springtime snowfalls are common. Spring and fall weather ranges from 30 to 80 degrees, calm to windy, blizzard to heat wave. A biker can park his cycle on a summery morning, go to work, and ride home on sheet ice that afternoon. This may happen even in mid-May. Denver is very conservative using snow removal equipment, preferring to let the 10 a.m. sun melt the 6 a.m. snowfall. Salt is rarely used.

"Black ice" can blend into the roadway and give drivers an unexpected spin. Also, blowing snow can cause whiteouts, especially in the mountains and on open sections of interstates.

Mountain driving is a special case. The Lowry Safety Office encourages drivers to carry "survival" items, such as dried food, space blankets, spare gas and waterproof matches, especially in winter. When the weather goes from great to Godzilla in minutes, being stranded even one mile from civilization is no joke.

While Colorado has no "chain law" per se, there are times when you can travel some roads only with snow tires, chains, four-wheel drive or a combination of all three. *DO NOT ATTEMPT* any road against the advice of state authorities. Their experience greatly outweighs your decision to press on. The odds are you'll find yourself stranded, hours away from help. Even the interstates are sometimes closed for days.

Smart travelers keep an ear on the weather forecasts. Dial 639-1212 for local, hourly updates. For road conditions in Denver and west, call (303) 639-1111. For conditions east of the city, call (303) 639-1234. Sometimes both need be called, for sunny conditions in the east may not prepare drivers for snowfall in the mountains.



Brings May . . . WHAT? While the freak snowstorm that blanketed Lowry AFB in mid-May, 1983, was far from usual, rapid and severe changes in the Denver area regularly occur in spring and fall. **(USAF photo by Don L. Lewis)**

CONSCIENTIOUS

There's an invisible bond among mechanics that reaches beyond their ability to handle tools and mend machinery. The unseen union is safety; not just their own while working but that of those who use the vehicles they've worked on.

It doesn't matter what the mission of the vehicle being worked on is. It could be a supersonic jet fighter, a high performance racing car or an everyday transportation special; the operators' as well as other people's safety is in the mechanic's hands.

A man who knows the extremes of being a mechanic is Lawton A. "Lanky" Foushee. More than 20 years ago as an Air Force staff sergeant he was a mechanic assigned to the 1254th Special Mission Air Transport Wing which handled Presidential aircraft maintenance. Today Lanky is the crew chief for Group 44, which races Jaguars on the International Motor Sport Association circuit and took that manufacturer's respected name back to Le Mans for the first time in 27 years.

Foushee thinks there are a lot of parallels in being an aircraft, racing, shop or backyard mechanic. "For one thing," he says, "you have to be very conscientious."

For the aircraft and racing mechanics "the biggest thing is being conscientious," he continued, "because you know that what you're doing is on a high-performance machine and a man's life depends somewhat on how well you did your job or didn't do your job. Out on the race track you do have the option of stopping if you think something is wrong; in an airplane you don't — at least for a long time.

"I think that that's what it basically comes to: That the work has to be absolutely as good as you can do with the best materials that you can do it with and the best methods that you can do it with.

"A lot of what I learned in the Air Force carries over into the racing business. We knew that with the passengers we carried on Air Force One, an error on our part literally could change world history. It made us take the job very seriously. When you picked up a wrench, you did it conscientiously and you were critical of the pieces involved."

Before being transferred to Washington National to work on Presidential aircraft, Foushee worked post-flight dock on C-124s at Dover AFB, Md.

From the stand point of an individual putting his or her life at extreme risk, "that's not there in street car maintenance," admitted Foushee. "But if a guy is going to depend on his transportation to get him back and forth to work, in some respects it gets to be pretty pertinent on how well he does the work on his car — or how well somebody does the work on his car.

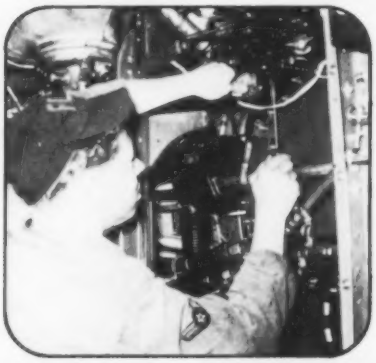
"People live in the fast lane now and automobiles are a very big part of what they do. It's a big part of their life style; their mobility."

Not only does work have to be done with the best materials, methods and efforts, it has to be done quickly in aircraft maintenance and racing.

"In the service we had a utilization rate that the whole group tried to make," Lanky explained. "When we were hauling heavy equipment we had deadlines to meet with the airplane no matter what was wrong with it when it came in. It had to be fixed and ready to go by a certain time.

"When we were hauling important people around it was even more important to meet your schedule. World events won't wait for a slow poke.

"And in the racing game they don't wait for you because you're not ready to race. We get paid well to represent Jaguar cars with a competitive race car on a race date. They're not going to listen to us saying 'we couldn't make it' or 'we didn't quite get through' or 'luck was against us in some facet that prevented us from starting the race.' We have got to start the race with a safe, competitive automobile.



Known then as A2C Foushee, Lanky changes a tach generator on the number four engine of a C-124.

"It's the same sort of deadline you meet when you work on airplanes. And nothing can fall off of it. We can't come back with a lost-in-flight excuse. We try our absolute dead level best to put out a good race car — a safe race car — a fast race car. That's what it's all about. Often it's quite a juggling act."

Actually, juggling is an excellent word to describe a crew chief's duties. The primary challenges are leadership and

Today Lanky is the crew chief for Group 44 which campaigns Jaguar XJR-5s in North American and at Le Mans.

According to Lanky, all mechanics have got to have a good background in fasteners, materials and methods.

"A good crew chief gets the work done by helping others to get it done," notes Lanky.

management. Lanky explains, "A good crew chief gets the work done by helping others to get it done. He can't do it all himself, even if he'd like to; he's got to trust others who've proven that they can do the work. He also has to help them get along with each other, meanwhile keeping the suppliers happy, the boss happy, and the clients happy.

"Actually, with Group 44 we've been pretty successful. We've been able to put together a group of guys who really love what they are doing. You have to, because racing isn't a 7:30 to 4 job. You've got to spend whatever time it takes to get the job done — and done right.

"We've also been fortunate through the years to have long term clients who make sure we have the resources to do the job the way it should be done. That's important because, as the level of racing goes up, the juggling act gets more complex. Now, we've got a world class car and a crew of 21. Each day it seems to escalate some more."

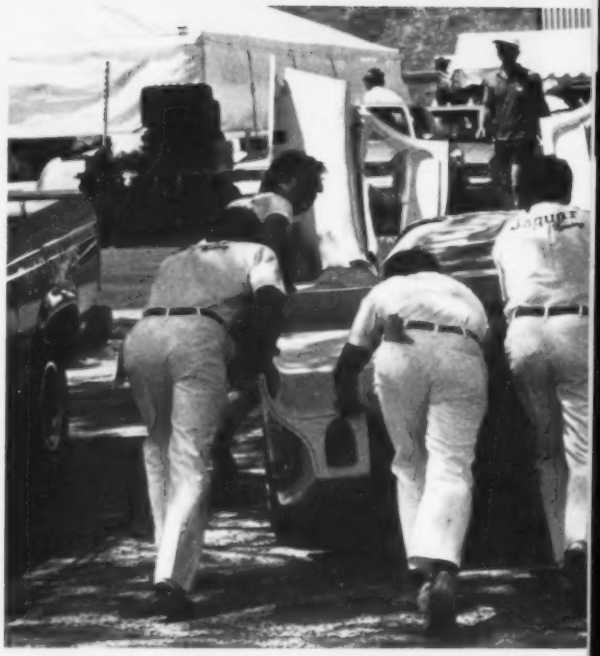
Lanky got his start in racing at the short tracks around his Durham, N.C., home. "I got all the dirty jobs like changing fluids and changing rearend gears and broken transmissions and that sort of thing," he remembered. "It was an entry level position that I could do at a high

continued

(above, left)
Even If he'd like to do the work himself, Lanky says he's got to trust others who've proven that they can do the work.

Lanky responds to a question from Group 44 head Bob Tullius.

One of the primary jobs of any crew chief is to provide a good communications link between the pilot (driver) and mechanics.



(right)
At Group 44 everybody pitches in when it comes to some tasks such as moving the cars from the pits to paddock including the driver (left front) and crew chief (right front).

At Group 44 appearance is important to the point that the cars are always polished, painted and cleaned inside and out.

school age. And I got an introduction to automotive mechanics at the same time."

Right at the end of his service career he got interested in drag racing because there was a lot of activity around the Washington, D.C., area at that time. He did some driving himself and crewed on some other cars. After he got out of the Air Force he continued drag racing with his brother for several years.

Eventually, Foushee was reintroduced to short track cars. He drove those a little and was partners on one for a while. Then he went to work for a guy who was running NASCAR's Grand American Series for pony cars in the late 1968-69 era. That's when he met Bob Tullius, Group 44 co-founder.

"I found out that he was needing mechanics and there was an opportunity there to go racing full time," Lanky recalled. "And get paid reasonably well — at least for mechanics' wages — for doing it."

Under the Group 44 banner, Lanky has prepared cars which have won four SCCA national championships, two Trans-Am driver's championships, and one Trans-Am manufacturer's championship. Individual racing wins have gone uncounted.

As crew chief on a top ranked team, Lanky often is asked how to break in as a professional crew member. "In order to go the distance in this sort of work, you really need well rounded, hands-on experience in all aspects of an automobile," he observed. "Staying in school is all important. I guess the ideal guy would be one with a college degree in mechanical engineering who also has four to five years broad based experience, either in a new car dealership or in a general repair shop.

"That experience is vital. It gives you the background to diagnose a problem and create a fix in a hurry, often under bad conditions, and always under the extreme pressure of the clock and with everybody and his brother looking in to see what you are doing.

"After all, endurance races are won, more often than not, by the team that is best prepared to overcome adversity. During six, 12 or 24 hours of racing, you have to expect some sort of mechanical trouble. With equally matched cars, the one that spends the least amount of time in the pits is the one that wins.

"That sort of sums up my goals for myself. I want to be considered by my peers as one of the best at what I do. That's all I'm really interested in. Not awards or public recognition, but knowing that I've done my best and that my contribution is appreciated by the people that we work with and race against.

"That's true wherever I've worked — at Group 44, back in the Air Force, or anywhere else."

The reward at Group 44 for all the hard work is a good placing on the track. On this day at Sears Point the team Jaguar XJR-5 cars which have won five IMSA Camel GT events since their introduction placed second and third.

YOU FORGOT US!

The article on the chief instructor workshop held this spring at Holloman AFB, N.M., (Chiefs and Indians, August 1984) was very well written, as was the related article "What an Experience!" However, I feel that two things should have been included in the first story. First, the Instructor Candidates (IC's) would have had a greater "sent home" rate if not for the efforts of the Chief Instructor Candidates (CIC's) who volunteered their time to come to our motel to help us instead of themselves. Second, I am a little perturbed by the sad fact that my name was somehow omitted from the story.

Congratulations to DRIVER Magazine for promoting motorcycle safety and the Motorcycle Safety Foundation.

SSgt. Kenneth R. Smith, USAF
Vandenberg AFB, CA 93437

The first thing I always do when the new issue of DRIVER arrives in the office is to check for articles on motorcycles and motorcycle safety. Without fail, I'm always pleased with the articles that are published, and upon seeing the August DRIVER I was extra-pleased: A whole story about my TDY to Holloman AFB and becoming an instructor for the Motorcycle Safety Foundation!

It was indeed a tough TDY, as I'm sure all of the newly graduated instructors would agree. It seemed that all around us, fellow instructor candidates (IC's) weren't quite up to par, and had to pack their bags and leave. The last thing any of us wanted to do was to fail the course, and upon returning home, face questions like, "What's the problem, Dave? Can't you ride a motorcycle?" If only it was that simple! In our group of IC's, we lost only one due to actual riding, yet by the time graduation rolled around, we were missing nearly half of our original class!

My helmet is off to each of my fellow instructors, and even to a few that didn't make it — because I know they'll be at the top of the list for next year's course. After all, we were there because we *wanted* to be there . . . not because we *had* to be there. And now, we're teaching motorcycle safety because we *want* to . . . not because we *have* to. And I, for one, love every single minute of it!

Sgt. David H. Gorham, USAF
Homestead AFB, FL 33039

P.S. My name was not printed as a new instructor . . . but I am!

Please accept our most sincere apologies. Somewhere between our typewriters and the actual printing of the magazine both your names vanished from the list of new instructors.

STICKER LOCATION LEGAL?

In your August 1984 article "Dirt's the Enemy," the car pictured had its base sticker located on the lower corner on the driver's side of the windshield. Is that "legal?"

Also, when washing or waxing your car, you must be careful to avoid scratches or nicks caused by your belt buckle, rings, or watchbands/ID bracelets.

MSgt. William T. White, Jr., USAF
Holloman AFB, NM 88310

Locally, the Norton AFB Security Police have authorized the lower left window placement of the base sticker when such registration will not remain affixed to the plastic coating on the bumper.

LIVING PROOF

All too often we are told about the gruesome things that have happened to people who were not wearing their safety belts and became involved in automobile accidents. But the horror isn't quite enough to get us to "buckle up" unless it may have happened to someone we know.

On a more positive note, here is a story on the horrors that were spared because of safety belt usage.

Two young second lieutenants right out of ROTC were assigned to Wright-Patterson AFB, Ohio, as their first duty assignment. Neither had ever worn safety belts before arriving, but they knew it is required by AF regulations. They also had heard that the Aeronautical Systems Division vice commander was really hard nosed on the subject of safety belt usage.

Unfortunately, our lieutenants were recently involved in an auto accident. It occurred when, one Monday after work, 2nd Lt. Joseph Pierce picked up 2nd Lt. Kelly Gaffney and then started to go home. After exiting the Interstate, they proceeded through an intersection and in doing so, rammed into an oncoming car. Lieutenant Pierce's car was totally demolished but since both officers were wearing their safety belts the lieutenants did not become human projectiles. Instead, one sustained a laceration to his chin and the other sprained her ankle while bracing herself for the impact.

The other car was also destroyed, but the driver was not as fortunate as our lieutenants. Since he was not wearing his safety belt, he sustained severe head injuries and was hospitalized for many days.

In an interview after the accident, Lieutenant Gaffney commented that "I always wear my safety belt coming to or going home from the base. But I hardly ever wear it when I'm going shopping or driving to a friend's house. Now I'm living proof that safety belts do their job. The horror of what could have happened to Lieutenant Pierce and myself is enough to make me 'buckle up' from now on, even if I'm only going down the street," added Lieutenant Gaffney.

As this incident relates, safety belts not only save lives but help prevent you from pain and suffering. "Buckle up"; it's a good habit to live with.

SSgt. Patricia Celes, USAF
Wright-Patterson AFB, OH 45433

DON'T YOU CARE?

I have just read your July 1984 issue, from cover to cover — well done! I too am in the business of saving lives and preventing injuries. In pursuit of this aim, I have this morning briefed all newcomers to this British base — on how to drive and survive on British roads.

Can you imagine taking one quarter of America's population (about 55,000,000) with all their cars, and homes, and every-

thing they own, factories, farms, schools, airports, coal mines, forests, parks, airports, lakes, rivers, etc., and placing them all in *ONE THIRD* of Texas? That's what we have in Britian, (which is just one third the size of Texas) and where we have nearly one hundred vehicles per every mile of roadway. Thus we have to devise and observe strict road safety laws, at national level, to maintain our high position in the world's road safety league. A seat belt law in early 1983 has cut road fatalities/casualties by over 20%! This law is *only* in respect of *front* seat passengers — a law to protect those in the rear is not far away.

I am amazed at America, lagging so far behind, when around 45,000 people annually are killed on your roads! Your July issue prints page after page telling us all what we already know . . . that seat belts save lives!! A law for front seat folks only in USA, would save around 8,000 lives annually! This saving is nearly twice the British annual total death toll! Come on America! Exercise your freedom of choice you safety conscious people — enact a law, and make all folks wear seat belts! Or don't you care?

N.J.J. Dunningham
APO NY 09127

TWO MORE OVERHEATING TIPS

Your article on "Handling Engine Overheating," (Aug 84, pg. 19) was very interesting and helpful, as I learned some new ways to handle this problem. I have heard that turning on your car's heater will also help cool the engine (though it can get pretty miserable for the driver). Would you comment on this?

Capt. Adele L. Fergus-O'Brien, USAF
Norton AFB, CA 92409

(Ed. Note: Please read on.)

Ref your Aug issue, pg. 19, Timely Topics item on handling overheating.

Great advice, particularly concerning shutting down the A/C which pumps hot air into the "engine room." You neglected to mention the other side of the coin, namely, the heater! If the overheating condition develops/continues after shutting down the A/C, switch over to the heating mode. Note I said heat and not defroster which in many newer cars also kicks in the A/C compressor. By engaging the heater, you get an extra couple of quarts of uncirculated and presumably cooler coolant into the system. This could mean the difference between frying your engine or not. It's a distasteful action because the car will already be heating up inside when the A/C is shut down. But at that stage, what's a few more degrees?

I've used this technique in traffic on several occasions in sunny Sacramento with success. It actually works better in slow rolling traffic when you get some airflow through the windows to counteract the increase in temperatures caused by engaging the heater. Why wait for the dumb guy light to go on?

Lastly, the proper PM to include a righteous mix of coolant improves your odds of staying cool during the summer traffic jam blues.

Keep up the great work with DRIVER!

Capt. Robert Decubellis, USAFR
McClellan AFB, CA 95652

JACK STANDS (AND DADS) SAVE LIVES

Hi. I read DRIVER Magazine every guard drill and I think it's pretty good! But, seriously, the reason I'm writing this is because in your March 1984 issue, on page 19, you have an article on jack stands. Well, I have a story for you and your readers. I hope it will make them think twice as I have and always will.

In the summer of 1979 my dad gave me my first car of many. It was a 1955 Olds 88. A fine car in its day but a big boat nowadays. Well, one day I had to pull the cross-member out so I jacked the car up on our dirt driveway with a bottle jack high enough for me to crawl under. Meanwhile, my dad, MSgt. Arthur Solots, then in the 148th Tactical Recon Group now in the 148th Fighter Interceptor Group, was working on his truck close by. Well, I put some blocks of wood under the frame just in case the jack ran out of juice and came down, at least the car wouldn't crush me. So I proceeded under to loosen the bolts. But by my reefing and pushing on the wrench I slid the car off the jack missing the blocks and coming down on top of me while I'm laying underneath on my side. I never panicked so hard in all my life. I somehow managed to pull myself over onto my back, hurting my arm. My dad heard the commotion and came running over to see my feet kicking and me turning colors. Quickly, he set up the jack and lifted the car off of me and slid me out. Luckily the car had the tires on because if it hadn't I probably wouldn't be writing this. After walking around catching my breath, my chest hurt so bad I went to St. Mary's Hospital Emergency Room, where as soon as I said a car fell on me, "boom," I was on a gurney getting x-rays taken. I was just bruised and sore for a couple of days, but it could have been worse if it wasn't for my dad. You see my dad and I aren't close at all and the only thing we do together is go to Minnesota Air Guard. So I'm hoping you'll print my story for three reasons: 1. He's retiring from the guard with 32 years of service; 2. I've never told him "Thanks, Dad." I hope this story will tell him that I owe him for the rest of my life for saving my life; and 3. So anyone else that works on cars will jack them and secure them with jack stands even before thinking of going underneath.

Nowadays I'm still working on cars but they have to be jacked up so secure a tornado couldn't blow them over. Even then I'm still shakey. So I hope you print this before my dad retires in March 1985. It'll show him I'm proud he's my dad and he saved my life!

SSgt. Richard Solots, ANG
Duluth, MN 55810

SEEING IS BELIEVING

As a member of the Air Force stationed in Florida, I have had ample opportunity to see the results of car accidents where the driver and/or passengers were not wearing seat restraints. The results are very tragic. I've only been in the military a short time, but during this short time I have responded to many vehicle accidents. It astounds me that of all the accidents not a single person was properly restrained, not even small children.

If the public could see what I and many other fire department personnel, not to mention the many ambulance attendants, see day after day I truly believe that many more people would BUCKLE UP.

I did not wear a seat belt before entering the Air Force, but I'm now one of the minority who does wear a seat belt. If you have never seen a small child in extreme pain or a young adult who had been disfigured, or even a middle aged person dead at the scene, then you don't fully realize the hazards out there on our highways. I've seen it and I strongly encourage each and every one to wear the restraint that was put in your vehicle to protect you. To quote a familiar saying — IF NOT FOR YOURSELF, HOW ABOUT FOR THE ONE YOU LOVE?

A1C Thomas A. Bastian, USAF
Patrick AFB, FL 32925

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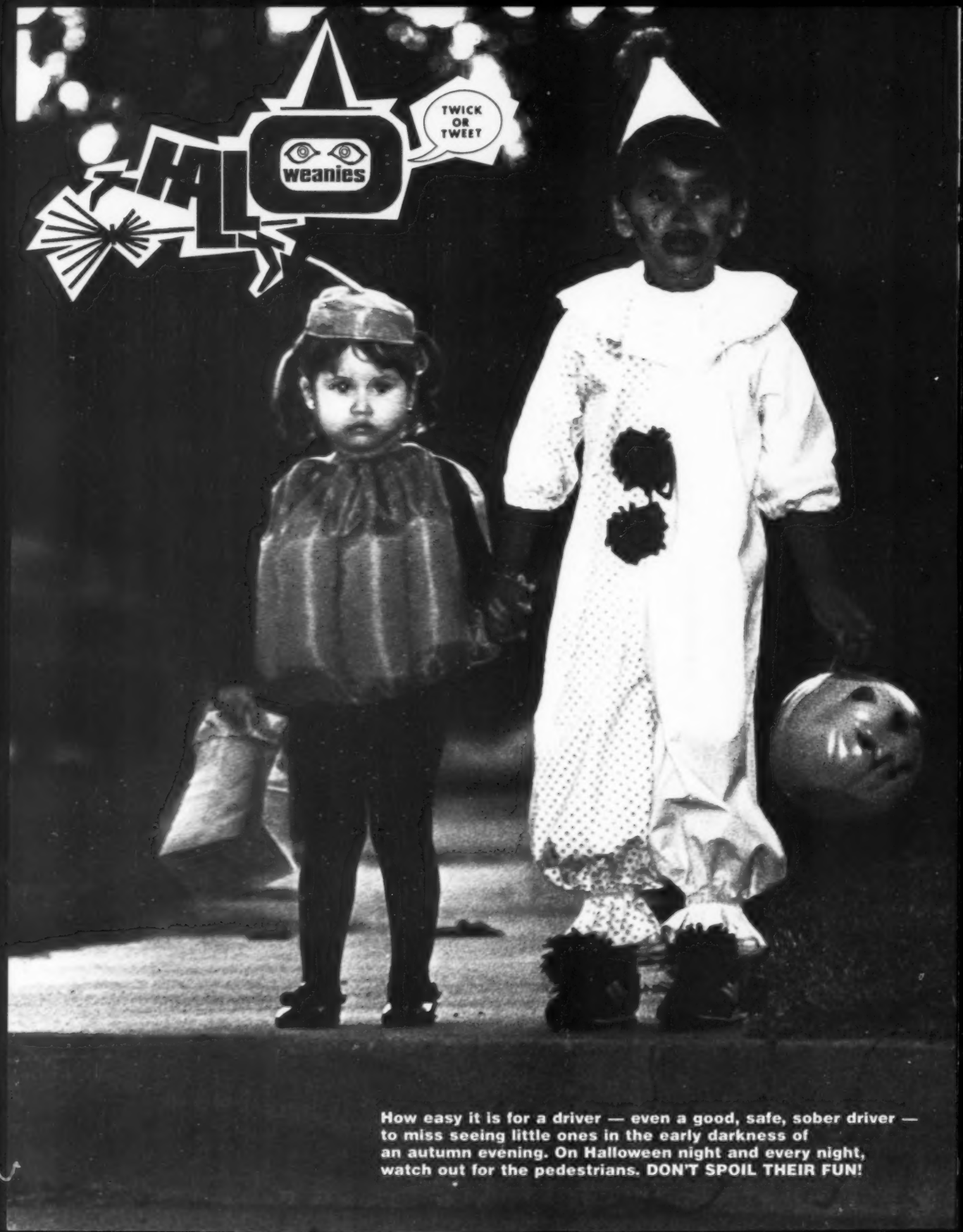

How easy it is for a driver — even a good, safe, sober driver — to miss seeing little ones in the early darkness of an autumn evening. On Halloween night and every night, watch out for the pedestrians. DON'T SPOIL THEIR FUN!